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Improved the Performance of Content Based Image Classification using Supervised Learning

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ABSTRACT
Image Classification and retrieval is current research trend in computer vision. In concern of classification, the rate of classification depends on the feature attributes of image data and depends on behavior of classifier and image feature, Color is one of the most widely used low-level visual features and is invariant to image size and orientation. The easy-to-compute color histogram is a popular and widely used image feature, Texture is also one of the important types of classification and is being widely intensively used in pattern recognition. A supervised classification is the process of using samples of known identity to classify pixels of unknown identity. In this paper we present the content based image classification using the unsupervised and supervised learning techniques.

Keywords: Image classification, Image retrieval, Neural network, Multimedia, texture classification.

INTRODUCTION
In the context of today's scenario the use of digital technologies produces a lot of digital images. Large collections of images are becoming available to the public, from photo collection to web pages, or even video databases. Since visual media requires large amounts of memory and computing power for processing and storage, there is a need to efficiently index and retrieve visual information from image database [1]. In recent years, image classification has become an interesting research field in application. Efficient indexing and retrieval of large number of color images, classification plays an important and challenging role [2].

Digital images can be formed by a variety of devices like digital scanners, cameras, co-ordinate measuring machines, digital video recorders, digital synthesizers and airborne radars. Among the various media types, images are of prime importance. Not only it is the most widely used media type besides text, but it is also one of the most widely used bases for representing and retrieving videos and other multimedia information. Usually, images are automatically recorded in meaningless alphanumeric filenames [3].

A traditional CBIC system automatically extract visual attributes (color, shape, texture and spatial information) of each image in the database based on its pixel values and then stores to them in a different database within the system called feature database. Consequently the feature data for each of the visual attributes of each image is very much smaller in size compared to the image data. The feature database contains an abstraction of the images in the image database; each image is represented by a compact representation of its contents like color, texture, shape and spatial information in the form of a fixed length real-valued multi-component feature vectors or signature [8].

The content based image classification systems can be widely classified as color, texture, shape, motion etc. Color based image classification is an important alternative and complement to traditional text-based image searching and can greatly enhance the accuracy of the information being returned [23]. It aims to develop an efficient visual- Content-based technique to search, browse and classify relevant images from large-scale digital image collections. Most proposed CBIC techniques automatically extract low-level features (e.g. color, texture, shapes and layout of objects) to measure the similarities among images by comparing the feature differences.

Supervised classification is appropriate when we want to identify relatively few classes, when we have selected training sites that can be verified with ground

truth data, or when we can identify distinct, homogeneous regions that represent each class [24]. Whereas Supervised classification is usually appropriate when we want to identify relatively few classes, when we have selected training sites that can be verified with ground truth data, or when we can identify distinct, homogeneous regions that represent each class.
The rest of this paper is organized as follows in the first section we describe an introduction of about the content based image classification introduction. In section II we discuss about the Image classification. In section III we discuss about the proposed method and architecture model for content based image classification. In section IV we discuss about the experimental result analysis and comparative study for both techniques, finally in section V we conclude the about our paper which is based on the literature survey and specify the future scope.

II IMAGE CLASSIFICATION

Image classification is basically the task of classifying the number of images into (semantic) categories based on the available training data. The objective of digital image classification procedure is to categorize the pixels in an image into land over cover classes [10]. The output is thematic image with a limited number of feature classes as opposed to a continuous image with varying shades of gray or varying colors representing a continuous range of spectral reflectance [11]. The range of digital numbers in different bands for particular features is known as a spectral pattern or spectral signature. A spectral pattern can be composed of adjacent pixels or widely separated pixels.

Digital image classification technique can generally be classified into two types: Unsupervised classification Techniques and Supervised classification Techniques [12]. Classification approaches deal poorly on content based image classification tasks being one of the reasons of high dimensionality of the feature space. A common approach to image classification involves addressing the following three issues: (i) image features: how to represent the image, (ii) organization of feature data: how to organize the data, and (iii) classifier: how to classify an image.

III PROPOSED WORK

In this paper we are using Unsupervised and Supervised Learning techniques to improve versatility, robustness and Precision and recall rate of automatic image classification. According to the both techniques there are different search strategies and mechanisms for the respective input image dataset. Feature extraction is very important phase of image classification. The extraction of feature process in two different modes on is frequency domain and another is frequency domain. In spatial domain the extraction of feature based on pixel based operation and in frequency based operation used transform based function.

The selection of feature play a major role in image classification for the selection of features used various technique such as direct searching technique and heuristic based technique. The direct feature selection technique is not promise the result up to mark. Instead of that heuristic based feature selection process, in below figure shows that the process of feature selection.

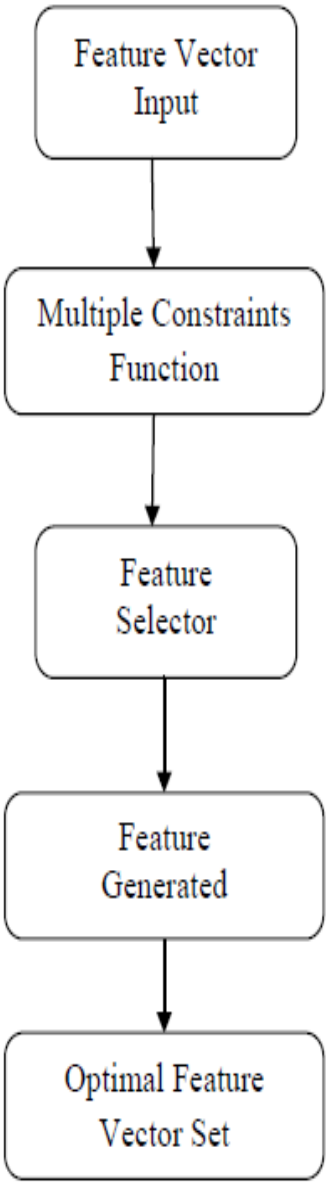

Figure 1: **Shows that the process of feature selection for the input of the classifier.**

In this section described a proposed method for Image Classification algorithm for the supervised learning. The classification of image data process through two different processes one is SVM and other is SOM neural network. Feature extraction is very important phase of image classification. The extraction of feature process in two different modes on is frequency domain and another is frequency domain. In spatial domain the extraction of feature based on pixel based operation and in frequency based operation used transform based function such as DCT, FFT, SIFT and DWT transform function.

The most suitable features are selected by handpicking from the feature spectrum based on the prior knowledge about the database of image. Here we used the data mining techniques such as unsupervised learning such as self organizing mapping network and supervised learning method such as support vector machines. Now we compare the both techniques for the content based image classification and obtain the different result or class for the input image dataset.

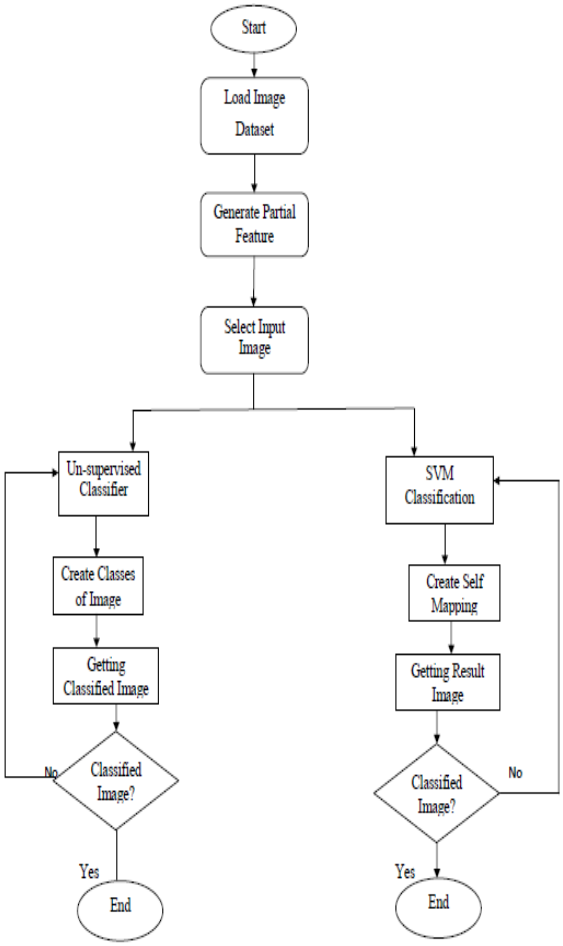

Figure 2: **Proposed model of image classification based on SOM and SVM.**

IV EXPERIMENTAL RESULT ANALYSIS

To evaluate the performance of proposed method of content based image retrieval or classification we have use MATLAB software with a variety of image dataset used for experimental task. Here we compare that our empirical result evaluation using the both techniques on which one is based on unsupervised learning and another one is based on supervised learning.

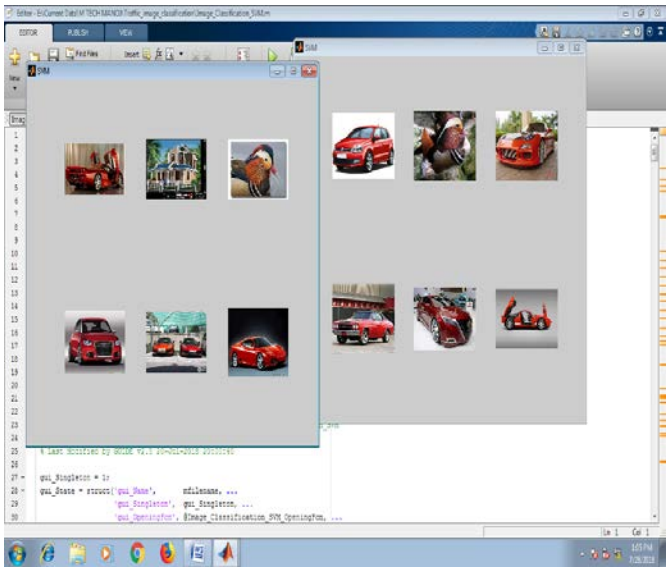

Figure 3: Retrieval image of Bird in various classes for the support vector machines image retrieval methods.

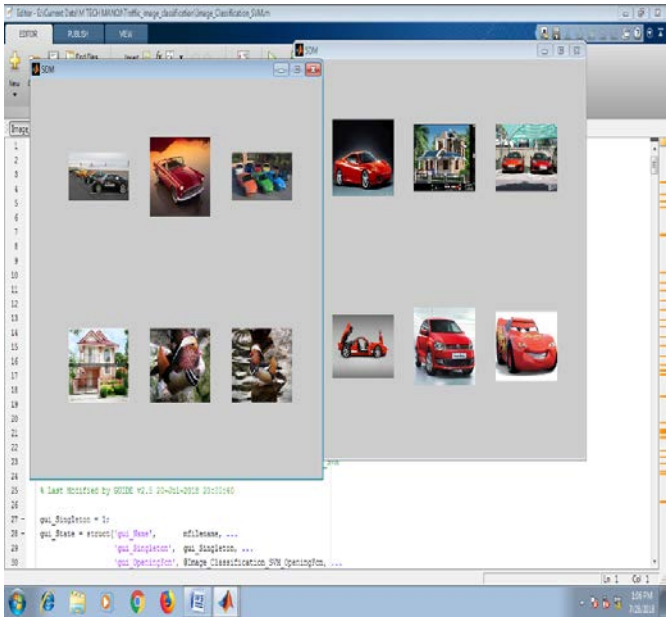

Figure 4: Retrieval image of Bird in various classes for the self organizing mapping network image retrieval methods.

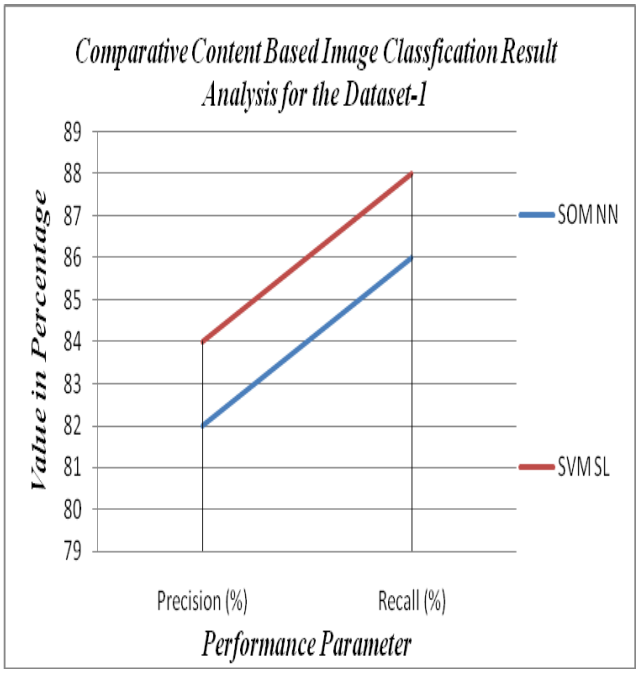

Figure 5: Comparative result graph of image retrieval methods with using dataset-1.

V CONCLUSIONS AND FUTURE WORK

In this paper we proposed a content based image classification using supervised learning and unsupervised learning techniques, our proposed supervised learning techniques give better result than other existing techniques and improved the ratio of classify image using some performance parameter. The process of feature extraction gives better result instead of another feature extraction technique. But still need some improvement for better result, now used optimization technique for the better selection of feature during image retrieval. For the optimization of feature study various optimization functions such as genetic algorithm, ant colony optimization and particle of swarm optimization.

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